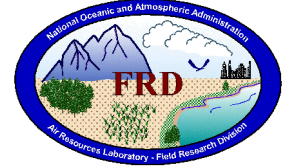




FRD Activities Report August 1999



Research Programs

Refractive Turbulence

New this month is our Refractive Turbulence Research Project funded by the Air Force. This project expands the cooperative effort with Airborne Research Australia (ARA), Atmospheric Turbulence and Diffusion Division (ATDD), and Phillips Laboratory. Our goal is to provide global stratospheric turbulence measurements to support the design and testing of the Air Force's Airborne Laser (ABL). Accurate, high frequency (50 Hz) measurements of the three components of fluctuating wind velocity, moisture and air temperature will be carried out in various theaters of interest to the Air Combat Command. The data will also be used in studies that evaluate the atmospheric refraction propagation effect on various civilian and military communication systems.

Under previous efforts at ATDD, three Best Aircraft Turbulence (BAT) probes were installed on ARA's Grob G520T Egrett high altitude research aircraft. As shown below, one probe is mounted under each wing and a third probe at the top of the tail. This symmetrical three-probe installation, when combined with the Egrett's slow 50 m/s flight speed, allows stratospheric turbulence measurements to be made that were never before possible. This month we participated in the operation of the Egrett, which collected 25 hours of data. Our future work will include improving



high-altitude temperature sensor response, conducting an intercomparison of other sensors used in the ABL program, and modifying the LongEZ for high-altitude operation. The LongEZ has been chosen as the instrument test platform for the instrument intercomparison study. (Tim.Crawford@noaa.gov, Jeff French)

Development of Smart Balloons Capability for Hurricane Research

We have received confirmation that U.S. Weather Research Program (USWRP) has funded a joint research project between FRD and the University of Hawaii. The proposal entitled “Investigation of the Inflow Boundary Layer of Atlantic Hurricanes” will be funded over the next three years. The funding will be used to further develop and enhance the current smart balloon design to operate in hurricane conditions and enhance sensor capabilities.

Presently our work is focused on:

1. Design a slightly larger balloon that will allow the transponder to be held inside the spherical balloon.
2. Determine how best to place the transponder and gas tight enclosure inside the balloon.
3. Develop a satellite data link.
4. Select a transponder GPS receiver engine and embedded controller with low power operations. One of the major criteria for transponders.
5. We are considering an alternative to the currently proposed differential correction scheme. The alternative approach is to use one of our Omnistar receivers with differential correction data received from all of the satellites visible over north America. This data could then be sent over the communications link to our balloon GPS receiver to increase the accuracy of the balloon altitude. (Randy.Johnson@noaa.gov)



Aerosol Characterization Experiment (ACE) Asia Smart Balloons

A Letter of Intent was sent to the NOAA Office of Global Programs to support the ACE-Asia intensive program. The Office of Global Programs has sent a letter back encouraging a full proposal to be submitted for review and possible funding commencing in FY 2000.

ACE-Asia (Aerosol Characterization Experiment), like ACE-1 and ACE-2 proposes 3 Lagrangian experiments with three smart balloons released per Lagrangian. The intensive portion of this project is proposed to take place in early 2001. (Randy.Johnson@noaa.gov)

LongEZ Preparation for SHOWEX and CASES

FRD scientists and engineers are preparing the LongEZ for deployment in the October CASES and November SHOWEX experiments. Detailed calibrations and airborne functional tests are being conducted on all sensors. The data acquisition software has been updated to reflect new sensor and configuration changes. New sensors this year include infrared and visible cameras inside the pod suspended beneath the LongEZ. Test flights have been conducted to verify the proper operation



of the sensors and data acquisition system. To learn more about the unusual LongEZ and its instrumentation, visit: <http://www.noaa.inel.gov/frd/Capabilities/LongEZ>. (Jerry.Crescenti@noaa.gov, Jeff French, Tim Crawford)

FRD SURFRAD Station

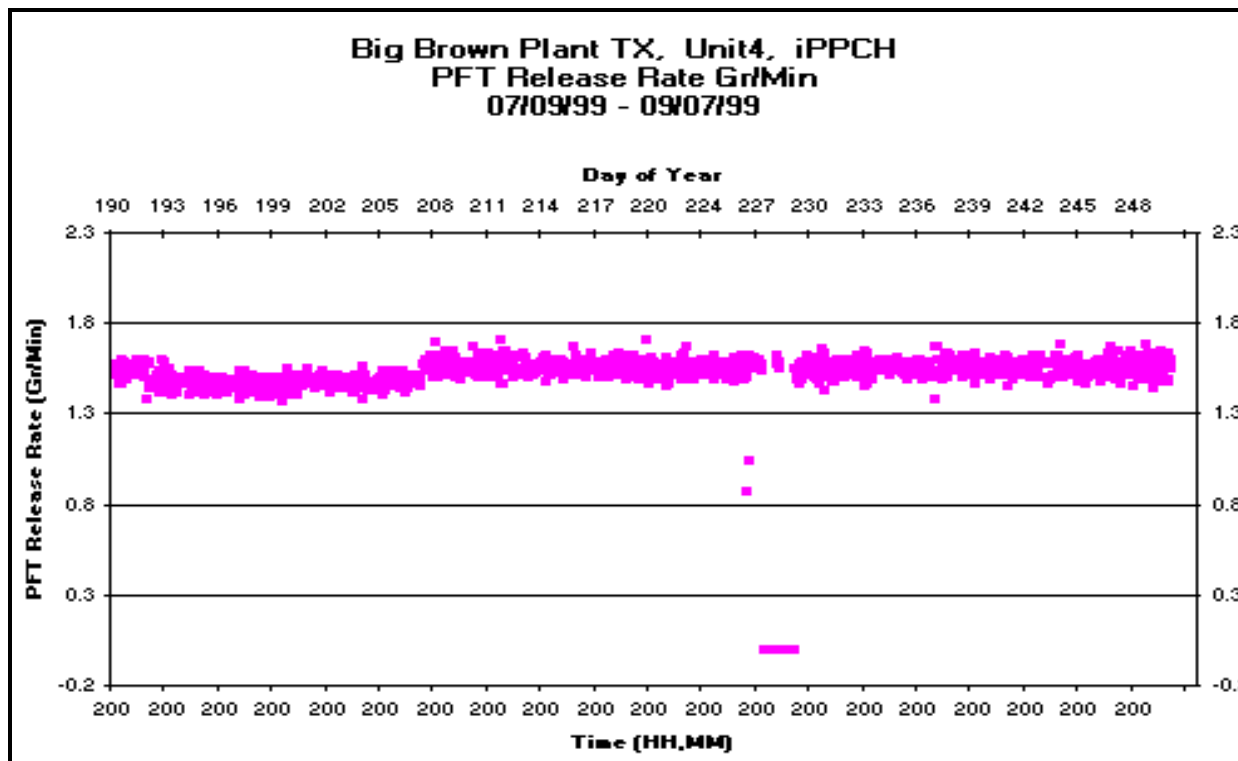
Cooperative efforts with SRRB are underway to establish a SURFRAD or ISIS Level 1 station at FRD. Talks are in progress with SRRB personnel to use existing FRD and SRRB instruments. FRD has 4 PSP's, 1 PIR, and 3 NIP's which can be used to establish the station. SRRB has offered a solar tracker sometime in the future, as old trackers are replaced with new ones. Meteorological data are already available at the proposed Grid 3 installation site. Funding constraints for the remaining instruments, of course, are a major concern. (Kirk.Clawson@noaa.gov)

BRAVO update

Samples from BRAVO have been analyzed and the tracers have been seen. The perfluorocarbon in the samples is running at about 2.5 to 5 parts per quadrillion (ppq). The background is about 1.5 ppq. The pattern in the samples indicates that the timing tracer concept is working as well.

Some minor problems were encountered in operation of the four automated release units, but the alarm and monitoring systems prevented any significant down time. At Eagle Pass, on 08/13/99 (Julian day 225) the Unit 2 air compressor tripped a circuit breaker and there was no carrier flow from 10:00 to 18:00. About 0.8 kg was released when the compressor restarted. This occurred again on 08/14/99 (226) from 10:00 to 17:00. About 0.6 kg was released when the compressor restarted. At Big Brown, on 8/16/99 (228) there was a second unscheduled shutdown of the boiler and

generator. The duct fans were turned off and tracer release stopped at 13:10. Tracer release resumed at 07:24 on 8/17/99. This can be seen in the following graph of continuous release rate. For more information on BRAVO or to view graphs of the daily release rates visit <http://www.noaa.inel.gov/frd/Projects/bravo.html>.



Cooperative Research with INEEL

Emergency Operations Center Support (EOC)

There were two range fires on the INEEL during the month of August. On August 6, an isolated afternoon thunderstorm storm passed over the site. A lightning strike started a range fire on the INEEL east of Lincoln Boulevard and several miles south of the Test Area North (TAN) facility. The EOC staffing alert notification was given at 16:45 MDT with Jerry Crescenti and Dianne Hoover responding for FRD to provide meteorological support. The fire was brought under control around 20:00 MDT and the EOC staff was cut to a minimum; only Jerry Crescenti was needed from FRD. The fire was contained around 00:50 MDT on August 7 and EOC support was terminated at that time. Approximately 6000 acres were burned. This was an especially difficult fire to fight since surface winds varied from southwesterly (large scale synoptic flow) in the early evening to easterly (shallow, cold air thunderstorm outflow from the Tetons) in the mid-evening to northerly (cold air drainage flow from the Yellowstone basin due to radiational cooling) in the late evening. FRD personnel provided timely short-range forecasts to the EOC.

Two weeks later on August 19, three small brush fires were started on the INEEL by afternoon thunderstorms. The EOC alert was given at 13:10 MDT with Kirk Clawson and Dianne Hoover

responding. Jerry Sagendorf replaced Kirk Clawson about an hour into the emergency. The three fires quickly merged into one large fire, moving north from Argonne National Laboratory (ANL West). Outflow from the thunderstorms helped to fan the flames. The fire was contained around 20:30 MDT and a minimum staff was maintained at the EOC. Jerry Crescenti represented FRD after 20:00 MDT. Meteorological support was requested through the night, and Kirk Clawson arrived at the FRD office at 23:00 MDT to begin preparations to staff the EOC through the night. However, EOC support was terminated at 00:05 MDT because of slow fire movement. The EOC was reactivated again the following morning at 07:00 MDT for continued support, because the fire was contained but not controlled. Jerry Crescenti provided meteorological forecast support from FRD. The EOC support was eventually terminated at 16:00 MDT when the fire was finally controlled. No facilities were threatened, however, approximately 40,000 acres or 60 square miles were burned. This accounted for about 7% of the total INEEL area. This was the largest fire in the 50 years of INEEL history. For more information on the brush fire stories, see <http://www.inel.gov/cgi-bin/newsdesk.cgi?a=116&t=template.html>. (Jerry.Crescenti@noaa.gov, Dianne Hoover, Jerry Sagendorf and Kirk Clawson)

FRD EOC Capabilities Demonstrated to New INEEL Site Contractor

Beginning October 1 of this year, the current INEEL site contractor (Lockheed Martin Idaho Technologies Company, LMITCO) will be replaced by Bechtel B&W Idaho (BBWI). As a part of the contractor transition, a demonstration of the INEEL EOC capabilities was given on August 25. For the demonstration, the EOC showed personnel participating in a mock INEEL radiological release emergency. The FRD meteorological support position was staffed by Kirk Clawson, who met with senior BBWI officials and discussed FRD EOC and INEEL meteorological support efforts. (Kirk.Clawson@noaa.gov)

INEEL Mesoscale Meteorological Network

The backup data feed to the INEEL Warning Communications Center (WCC) was placed back in operation this month. The WCC maintains communications with all INEEL facilities during emergencies and plays a key role in disseminating information. Their primary source of meteorological data is an INEELViz workstation, but a backup source of text data is provided to them over a dedicated telephone line. This data feed had been experiencing problems for several months. The source of the problem was eventually traced to an improperly configured telephone line and corrected. (Roger.Carter@noaa.gov)

The University of Utah notified us that their computers had been "compromised by hackers" and that the "hackers" may have gained access to the password to our mesonet servers. The University of Utah uses this password to retrieve INEEL mesonet data every 15 minutes for inclusion in their regular runs of the MM5 model and for inclusion in the Utah Mesonet (see <http://www.met.utah.edu/jhorel/html/mesonet/mesonet/utah.html>). When we were notified, we changed their password to prevent unauthorized access to our servers. There was very little likelihood of hackers attacking the FRD LAN because the Utah servers connect through a FRD FTP server providing read-only access to the mesonet data. (Roger.Carter@noaa.gov)

Support of INEEL Emergency Planning

Three more INEEL emergency response drills were conducted during August using special "fake weather" data provided by FRD. These are special data sets created to force the meteorological conditions to match the drill scenario. During the drill, the fake data is displayed on INEELViz workstations of the drill participants, allowing them the ability to react exactly as they would in real time for a real emergency situation. (Roger.Carter@noaa.gov)

In addition to providing support to the DOE Emergency Operations Center (EOC), FRD staff also provide support to the State of Idaho Oversight Program. Oversight has the responsibility to interface with state and county emergency response personnel when INEEL accidents and wildfires affect the offsite public, including the 5 counties bordering the INEEL. Each county has an INEELViz workstation sans MDIFF modeling capability. Oversight wanted the capability to send INEELViz model results to each county from the EOC, without enabling the model on each workstation. To accomplish this, INEELViz was modified to send model output to the FRD web server, thereby allowing county EOC operators to view the model results through their web browsers. Only the INEELViz workstations in the DOE/EOC will have this model output web link capability. Thus, every major player in an INEEL emergency will have access to the same model results. The ability to annotate the model output was also added. (Brad.Reese@noaa.gov)

A training session on the use of INEELViz and the MDIFF model were conducted at the Argonne National Laboratory-West (ANL West) facility located at the INEEL. The training was for all personnel staffing the emergency operations center at ANL West. (Brad.Reese@noaa.gov, Jerry Sagendorf)

New Atomic City Meteorological Station

Construction of the new Atomic City meteorological station began on August 23. The city is small by population count, but is the city closest to the boundaries of the INEEL. It also is situated in the heart of wildfire country, and is subject to those forces of nature. The new station will help emergency response personnel monitor the fire fighting needs of the city, and aid in evacuation of the public if a radioactive plume should ever threaten. (Kirk.Clawson@noaa.gov and staff)

INEEL Monitoring and Surveillance Committee (MSC) Chairmanship

Kirk Clawson has been elected by the INEEL MSC membership to serve as the chairman. The MSC group brings together a diverse group of people who have interest in environmental monitoring on and around the INEEL. The purpose of the organization is to foster communication among the widely dispersed membership. Membership includes personnel from DOE, the State of Idaho, Lockheed Martin Idaho Technologies Company, USGS, Environmental Science and Research Foundation, and the Shoshone-Bannock Indian Tribes. At the first meeting conducted by the new chairman, Neil Hukari gave a presentation entitled "INEEL Wind Flow Patterns from Cluster Analysis," and then Jeff French gave a presentation entitled "Observations of Microphysics Pertaining to the Development of Drizzle in Warm, Shallow Cumulus Clouds." (Kirk.Clawson@noaa.gov, Neil Hukari, and Jeff French)

EMWIN System Reinstalled

The EMWIN system, which is used as a backup source for National Weather Service (NWS) data in the INEEL Emergency Operations Center (EOC), was reinstalled this month. It was temporarily removed while the roof of the building was being repaired. The EMWIN system receives NWS forecast products broadcast from NOAA GOES satellites. The data set is not as complete as what our Marta system receives, but provides a useful subset of data when Internet connections are down. (Roger.Carter@noaa.gov)

Other Activities

Papers Written and Submitted

Hacker, J. M., and T. L. Crawford, 1999: The BAT-probe: The ultimate tool to measure turbulence from any kind of aircraft (or sailplane). *J. of Technical Soaring*, **XXIII**(2), 43-46.

Vandemark, D., P. D. Mourad, T. L. Crawford, C. A. Vogel, J. Sun, S. A. Bailey and B. Chapron, 1999: Measured changes in ocean surface roughness due to atmospheric boundary layer rolls. *J. Geophys. Res.*, submitted.

Crescenti, G. H., T. L. Crawford, and E. J. Dumas, 1999: LongEZ (N3R) participation in the 1999 Shoaling Waves Experiment (SHOWEX) Spring pilot study. NOAA Technical Memorandum, submitted for NOAA review and clearance.

Eckman, R., et al., 1999: Airborne meteorological measurements collected during the Model Validation Program (MVP) field experiments at Cape Canaveral, Florida, in press.

Sagendorf, J. F., and D. W. Walker, 1999: Accident Risk Assessment using a Puff Trajectory Model. Emergency Response '99 Symposium, Sante Fe, NM, September 14-17.

Wenzel, D. R., J. F. Sagendorf, B. J. Schrader, and R. F. Bonney, 1999: Prompt evaluation of accidental airborne radiological releases at the INEEL. Emergency Response '99 Symposium, Sante Fe, NM, September 14-17.

Papers Reviewed

Gillette, D., et al., 1999: Supply Limited Horizontal Sand Drift at an Ephemeral Crusted, Unvegetated Saline Playa, reviewed by Neil Hukari.

New Mesoscale Modeling Position

This month FRD created a new mesoscale modeling position. This new position will provide a wealth of mesoscale modeling opportunities. FRD is known nationwide for its expertise in atmospheric tracer technologies. FRD seeks a mesoscale modeler to advise, design, and conduct research programs that develop and test mesoscale transport and diffusion models. The incumbent will

participate in the subsequent analysis of data from those experiments. Thus, the incumbent will serve as the local expert on mesoscale models. S/he will also be expected to support the Division's commitment to the INEEL through routine and specialized meteorological diffusion modeling and emergency response support. The potential for professional growth lies in the analysis of field research and implementing new modeling features and solutions as techniques are generally advanced. The incumbent is expected to report results in the open literature, at scientific conferences, and in internal reports. (Kirk.Clawson@noaa.gov)

NRC Postdoctoral Award

Under the National Research Council's Research Associateship Program, we are seeking an outstanding postdoctoral scientist or engineer to work with us as a guest for two years. Opportunities for research include airborne Geoscience, remote sensing and atmospheric chemistry. If you know of a candidate, please refer them to <http://www.noaa.inel.gov/news/> for more information. (Tim.Crawford@noaa.gov)

FRD Research Activities

Over the last ten years, FRD has averaged six research projects per year with four being major field experiments. The research sites have included cities from California to Florida, Canada to Mexico, as well as several international locations. To answer the question "what type of research projects were conducted", a list of FRD activities over the last three decades has been compiled. For a brief glimpse of some of these diverse and very interesting projects, visit our site at <http://www.noaa.inel.gov/news/OldProjects.html>. (Joyce.Silvester@noaa.gov)

Travel

Paula Fee and Joyce Silvester attended the MASC/CAMS Workshop August 3 and 4 in Boulder, CO. While at MASC, they met FRD servicing personnel in finance, property, real estate, human resources, procurement, and security offices. (Paula.Fee@noaa.gov)

Tom Watson traveled to Salt Lake City, UT August 26 and 27. He met with Chris Biltoft of the Dugway, West Desert Test Center Meteorology and Obscurants Division and representatives of the Air Force Research Laboratory Space Vehicles Directorate to discuss Chemical Ionization Mass Spectrum analytical instruments, the OLAD project data analysis, and the upcoming VTMX planning meeting. (Tom.Watson@noaa.gov)

Training

Betty Hess, Demo Project Coordinator, and Donna Swallow, MASC/HRD Specialist, gave a Demo training to employees and rating officials on August 16 and 17. The presentation was well prepared, and their personal attention to the questions was well received. They also took the time to meet with employees who wanted to talk to them privately. (Paula.Fee@noaa.gov)

Visitors

Rick Eckman from the Atmospheric Turbulence and Diffusion Division (ATDD) in Oak Ridge, TN, visited FRD from August 11-13. Rick worked with FRD scientists and engineers on the preparation of the LongEZ for the upcoming CASES field study that will be conducted during the month of October in Kansas.

Ken Melville and Peter Matusov from the Scripps Institute of Oceanography (SIO) in La Jolla, California, visited FRD from August 18-19. Melville and Matusov worked with FRD scientists (Jerry Crescenti, Jeff French and Tim Crawford) on the installation of infrared and visible cameras inside a pod suspended beneath the LongEZ. These two imaging devices will be used for the upcoming SHOWEX field study that will be conducted from November 10 to December 10 on the Outer Banks of North Carolina.

Dave Dunlop and Tom Neff from the Mitretek Corporation visited FRD on August 23. The office of NOAA Corps Operations has engaged Mitretek to evaluate the use of light aircraft by NOAA's Aircraft Operations Center.